

fiendish intent through the midnight silence. His fierce hoot is now less heard than formerly for his numbers are much depleted. The law offers him no protection and every man's hand is raised against him. More's the pity, for he is a handsome fellow when he stares at you with a look of sapience from his great yellow eyes. His badness is not unmixed with good, and while we may not palliate his faults we should not let them mitigate against others of his kinsfolk that are in every way entitled to protection and esteem.

COLUMBUS, OHIO.

A CRITICAL STUDY OF THE DISTRIBUTION AND ABUNDANCE
OF *DENDROICA CASTANEA* AND *DENDROICA STRIATA*
IN THE SOUTHEASTERN STATES DURING THE
SPRING AND FALL MIGRATIONS*

BY THOMAS D. BURLEIGH

It is doubtful whether more confusion exists concerning the actual status of two really common birds in the southeastern United States than in the case of the Bay-breasted Warbler (*Dendroica castanea*) and the Black-poll Warbler (*Dendroica striata*). This is due partly to the fact that, with the exception of Florida, field work in this region has been largely confined to the summer months, and to the unwarranted supposition that the distribution of these two species was well known. Were they subspecies—that bane of all amateur bird students—there might be more excuse for the haphazard manner in which they apparently have been treated. Recent field work in Georgia and North and South Carolina has revealed discrepancies in their range that it is felt advisable to correct at this time, and it is for this purpose that this paper is presented.

Quoting briefly, the following comments summarize the present knowledge, accepted for many years, of these two species in the southeast:

The Fourth Edition of the A. O. U. Check-List states that the Bay-breasted Warbler is "irregular in migration on the Atlantic slope and rare south of Virginia". Concerning the Black-poll Warbler nothing is said relative to the probable migration route. Pearson and Brimleys' "Birds of North Carolina" says of the Bay-breasted Warbler: "Only known as a rare fall transient at Chapel Hill and a rare spring transient in the southern mountains. At Chapel Hill a male was taken

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on October 2 and another on October 8, 1897, by Pearson." And of the Black-poll Warbler: "The whole state during the migrations. In autumn it appears about the last week in September and leaves late in October, a few sometimes lingering on into the first week of November."

In his "Birds of South Carolina", Arthur T. Wayne says of the Bay-breasted Warbler: "The only well authenticated records of the occurrence of this warbler in the State were furnished by Mr. Loomis, who procured a specimen on May 14, 1887, and another on May 5, 1888, at Chester." While concerning the Black-poll Warbler: "It occurs abundantly on the coast during both migrations."

In a bulletin entitled "A Second Supplement to Arthur T. Wayne's Birds of South Carolina", published by the Charleston Museum in 1931, further information relative to the occurrence of the Bay-breasted Warbler in the State is given as follows: "Mr. Wayne on October 18, 1922, took an adult female at Mt. Pleasant, Charleston County, making the first record of occurrence for the coast and the first fall record for the State."

Georgia unfortunately has no State list, and relatively little has ever been published concerning the bird life of that State. The few local lists that are available are obviously inconclusive and add nothing to our knowledge of either the Bay-breasted or the Black-poll Warbler.

So much then for the two Carolinas and Georgia. Omitting for the time being Florida and Alabama, both of which will be considered a little later, let us consider the facts brought out by practically fourteen years of consistent field work in this region.

From the middle of September, 1920, through the first of January, 1930, almost daily records were kept of the bird life at Athens, Georgia. Athens lies in the northeastern corner of the State, near the center of the Piedmont Plateau, which comprises practically half of the State, and is characterized by rolling hills, red clay soil, and scattered stretches of woods in which the shortleaf and loblolly pines predominate. Proximity to the Coastal Plain farther south, and to the foothills of the Southern Appalachians farther north, was found to influence the distribution of bird life during the summer months but in so far as migration is concerned records obtained about Athens are characteristic of this entire Piedmont region.

Here the Black-poll Warbler was found to be an abundant spring migrant, appearing as early as the 19th of April and lingering until the end of May. In the fall, however, its status changed completely,

for it was then exceedingly scarce. Careful observation year after year failed to reveal a single individual of this species, and not until October, 1929, was it definitely recorded for the first time in the fall migration. Two birds collected then, one on the 14th and one on the 15th, are the only records for this species in the fall for this ten-year interval.

The Bay-breasted Warbler, on the other hand, while far less abundant in the spring, was found to be a fairly common fall migrant. During the spring months single birds, rarely two or three together, were observed at irregular intervals from the 29th of April through the 18th of May, the larger number being noted during the first week in May. In the fall, however, small flocks were frequently seen in the scattered stretches of woods, extreme dates for their occurrence then being October 3 and November 5. Their comparative abundance aroused a suspicion as to their identity and individuals were collected from time to time with the thought that they might prove to be Black-polls, but invariably they were found to be immature Bay-breasted Warblers.

Since the first of January, 1930, and up until the present time, careful records have been kept of the bird life about Asheville. Here in the mountains of western North Carolina the occurrence of the Black-poll Warbler and of the Bay-breasted Warbler in the spring and in the fall has been found to be exactly the same as at Athens. Each year the Black-poll Warbler has been an abundant spring migrant, and completely absent in the fall. Because of its extreme scarcity in Georgia it was looked for during the fall months whenever there was the slightest possibility of finding it, but not a single individual was seen. In decided contrast was the relative abundance of the Bay-breasted Warbler. Fairly common during the spring migration, it was actually plentiful each fall, there being days, as on the 5th of October, 1932, when it actually outnumbered all the other warblers seen. That there might be no question as to their identity individuals were again collected at frequent intervals, and in no case did a probable Bay-breasted Warbler turn out to be a Black-poll. In this connection, considering the early date at which the Bay-breasted Warbler appears in the fall farther north, extreme dates of arrival and departure may be of interest. The earliest record is that of a single bird seen September 12, 1930, in the spruce woods at the top of Mt. Mitchell, the average date of arrival for four years being September 19. The latest record is that of three birds seen October 19, 1932, with the average date for departure October 15.

In view of the fact that the Bay-breasted Warbler was a common fall migrant in the northern half of Georgia and in western North Carolina there seemed no reason why, despite the lack of records, it should not be equally common in at least the upper edge of South Carolina. To settle this point a brief field trip was made October 10, 1933, into Greenville County, and within an hour after crossing the South Carolina line an adult male in fall plumage was seen and collected. Although but the second record for the occurrence of this species in the State in the fall, further field work would probably prove it to be not only a regular but a common migrant here during the fall months.

Bearing in mind then the facts brought out by this brief discussion of the actual status of the Black-poll and the Bay-breasted Warbler in the two Carolinas and in Georgia it is obvious that for some time much misinformation has existed concerning these two species. What is actually true concerning their present distribution is as follows:

With the exception of the coast region the Bay-breasted Warbler is a fairly common migrant in the southeastern states, especially during the fall migration when for a month or more small flocks can be observed almost daily. This is further verified by the published records that are available for Alabama and Florida.

Arthur H. Howell has recorded the bird in the fall in Alabama, taking two specimens "in pines on the slopes of Choccolocco Mountain near Piedmont, October 20, 1916"; and in his "Florida Bird Life" he states that it is "a rare spring and fall migrant" in that State. In this connection it is significant that practically all records are from the western part of the State, and that on October 26 and 27, 1925, twenty-nine were reported as killed at a lighthouse near Pensacola.

On the other hand the Black-poll Warbler is abundant in the spring, but common only on the coast in the fall. It apparently, in its west to east migration in the fall from its breeding grounds in the far northwest, is moved by some impulse to reach the coast as soon as possible, and as a result is at best merely a straggler over much of the area it occupies in the spring migration. This is borne out by what is known of its occurrence in Alabama and Florida. Howell, in his "Birds of Alabama" says that "The bird is occasionally seen in spring in the northern half of the State, but there is no record of its occurrence in Autumn". Again, in his "Florida Bird Life", he states that it is "an abundant spring and fall migrant, except in northwestern Florida. Apparently this species avoids or flies over western Florida

in its migrations". It must be admitted that this is a rather unusual migration route, and one that as far as present knowledge goes is not followed by any other species, but there appears no other way in which to interpret the facts that have been brought out.

Further corroboration of this theory is given in a letter from Dr. J. J. Murray of Lexington, Virginia, dated October 24, 1933, in which he says that the Black-poll Warbler is a common migrant at Lexington, but twice as numerous in the spring as in the fall. In northern Virginia, according to Miss May T. Cooke in her "Birds of the Washington, D. C., Region", there is no perceptible difference in numbers in the spring and in the fall, so apparently in the northern half of the State the swing toward the coast is already clearly defined.

The question will possibly arise as to why these two species should for so many years be confused in this manner. Several reasons suggest themselves, and probably all have a direct bearing on this problem. Some years ago the Bay-breasted Warbler was generally considered a rare migrant, and while it has undoubtedly markedly increased in numbers in recent years, the assumption that it is uncommon has persisted in the minds of many bird students. The Black-poll Warbler has always been abundant in migration, and as there has never been any suggestion that the route it followed might vary in the spring and in the fall, it apparently was merely taken for granted that birds observed in the fall in plumage resembling Black-poll Warblers at that season were of that species. This uncovers another fallacy, that these two species are extremely difficult to identify in the fall unless actually collected. It is true that there is a remarkable similarity in the plumage of the two at this time of the year, but with good binoculars they can be readily recognized. The average Bay-breasted Warbler then seen reveals its identity by the trace of chestnut on its flanks, and by its buff rather than yellow underparts. The buff under tail-coverts, in contrast to the white of the Black-poll Warbler, likewise aid in separating these two species, but unfortunately there is more or less variation in this respect. The best field mark to bear in mind, however, is without doubt the color of the legs. In the Bay-breasted Warbler they are dark brown, in some cases almost black, while in the Black-poll they are light colored, almost yellowish. Both species are rather unsuspecting, and for warblers they are deliberate in their movements; therefore little difficulty should ever be experienced in satisfactorily identifying individuals seen in migration.

NOTE: A letter from Mr. Albert F. Ganier of Nashville, Tennessee, dated November 7, 1933, was received too late to be included

in this summary. In his opinion both the Bay-breasted and the Black-poll Warblers are common transients in Tennessee. However, in his collection of skins, the only one in the State, there is but one Black-poll Warbler, a male taken May 15, 1916. He apparently has never taken the bird in the fall, so until definitely proven otherwise this species must be considered a spring migrant only in Tennessee.

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RELATIONSHIPS BETWEEN DIET AND EXTENT OF PARASITISM IN BOB-WHITE QUAIL

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During the course of a two-year food and parasite survey of Missouri Bob-White Quail (*Colinus virginianus virginianus* Linn.) considerable data was amassed. To a large extent the information secured merely corroborated that obtained previously by other investigators (Errington, '31-'34, Stoddard, '31). In addition, however, the data brought out some new side-lights and interesting implications heretofore untouched, or at least very little emphasized in quail investigations, and indicating a relationship between diet and parasitism in the bob-whites.

The food-list of the bob-white is a very long one; crop analyses (Stoddard, '31) show that practically any accessible seed may be eaten, together with a long list of fruits. Naturally, not all these seeds are eaten by preference nor do they all contain available nourishment. In Missouri (Nagel, '33) the kinds of foods quail eat by preference, and which afford the proper elements of nutrition, are as follows:

Cultivated grains (corn, sorghum cane, millet, Kaffir corn, soy beans).

Ragweed (*Ambrosiaceae*).

Legumes (*Leguminaceae*) (Wild beans, peas, beggarweed).

Buckwheat (*Polygonaceae*) (Smart-weed, Knotgrass).

Senna (*Cassiaceae*) (Partridge-pea).

Grasses (*Graminae*).

This is not, of course, a complete list. It includes the foods most commonly eaten in the order of nutritional value and of preference.¹

¹It is a question whether "preference" might not be due largely to quantity and accessibility.